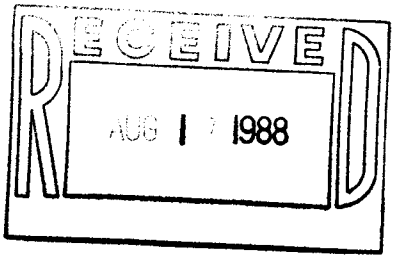
File: Holla Bend



TO: DON ORR,

FROM: REFUGE MANAGER, HOLLA BEND NWR

FOR YOUR INFORMATION

ATTACHED IS THE SUMMARY REPORT DONE AT HOLLA BEND BY

DR. CHARLES PRESTON.

ALSO, ATTACHED IS PROPOSAL FOR CONTINUATION OF PROJECT.

MARTIN D. PERRY
REFUGE MANAGER

FOOD-NICHE AND BEHAVIORAL RELATIONSHIPS IN AN OVERWINTERING RAPTOR COMMUNITY: PROJECT 43590-871

Summary Report 1986-1988

Dr. Charles R. Preston

University of Arkansas at Little Rock

Fieldwork was conducted during November and December 1986; January, February, November, and December 1987; and January and February 1988. Our objectives were to: a) determine relative rodent densities in agricultural habitats, b) determine the distribution and abundance of Northern Harriers, Red-tailed Hawks, American Kestrels, and Bald Eagles, c) quantify the diet of Northern Harriers, and d) determine the feasibility of trapping and banding American Kestrels, Red-tailed Hawks, and Northern Harriers.

Rodent densities--The relative abundance of rodents was determined in corn fields, soybean fields, old fields, and marshes (moist soil units). Thirty to fifty Sherman live traps were set in each habitat for two successive nights during each study month. Our survey included 2400 trap nights. Five species of rodents were captured in the study area: house mouse (Mus musculus), deer mouse (Peromyscus maniculatus), fulvous harvest mouse (Reithrodontomys fulvescens), hispid cotton rat (Sigmodon hispidus), and rice rat (Oryzomys palustris). The deer mouse and fulvous harvest mouse were uncommon in the study area, while each of the other species was encountered frequently. Marshes and cornfields generally produced the most rodents (Figure 1). The abundance of rodents in cornfields dropped markedly after

November each year, as the availability of fallen ears of corn diminished.

Raptor abundance and foraging distribution--To determine monthly changes in open-habitat raptor abundance, a 9-mile roadside survey was conducted at 0930 one day during each month of the study. Although weather conditions varied monthly, we attempted to standardize surveys as much as possible by avoiding environmental extremes (e.g., high winds, precipitation). Of the four species surveyed, two (American Kestrel and Red-tailed Hawk) are breeding residents at Holla Bend. However, the breeding populations of these species are augmented by northern migrants during fall and winter months. The Bald Eagle and Northern Harrier are winter-only residents in the study area. Migratory raptors usually begin arriving in Arkansas during late September or early October and begin to depart overwintering grounds in February or March, depending on weather conditions. Abundance of each of the raptor species studied at Holla Bend was lowest in November and highest in January each year (Figure 2).

Foraging distribution among the habitats was determined for Northern Harriers and Red-tailed Hawks (Figure 3). Harriers foraged more frequently in corn fields and marshes than expected by chance, while red-tails frequented corn fields and old fields more than expected by chance. Harrier foraging distribution is best explained as a response to the interaction of habitat availability and rodent abundance (Figure 4). Red-tailed Hawks, however, are dependent on perch sites from which to hunt. Foraging distribution of these birds is best explained as a

response to the interaction of perch habitat availability and rodent abundance (Figure 5).

Northern Harrier diet--Regurgitated pellets, containing undigested remains of prey, were collected during January and February 1988 from a communal roost used by Northern Harriers. The communal roost was located in an old field directly east of of and adjacent to moist soil area "G". Ninety-four pellets, containing the remains of 143 vertebrate prey items were recovered. Eighty-two (57%) of the prey items were birds. The most frequently occurring birds in the harrier diet were Red-winged Blackbirds (18 individuals), Eastern Meadowlarks (16 individuals), and Dark-eyed Juncos (12 individuals). Game birds found in the harrier diet included one Mallard, one Snow Goose, and one Northern Bobwhite. The goose and mallard were probably scavenged by harriers. The remaining 61 prey items were mammals. The most commonly occurring mammals in the harrier diet were cotton rats (22 individuals), house mice (19 individuals), and rice rats (13 individuals).

Raptor trapping/banding--During February 1988, we trapped, banded, and released two American Kestrels (USFWS 1443-16001, 1443-16002) and one Northern Harrier (USFWS 745-62051). We found that a three-celled Potter trap with live bait in one closed cell was the most effective means of trapping kestrels. A bal-chatri trap fitted with 10-pound monofilament nooses was used to trap the harrier.

General conclusions--Holla Bend National Wildlife Refuge is an important overwintering area for open-country raptors. Raptor use of the refuge is greatest in January and February.

The two most common species, the Northern Harrier and Red-tailed Hawk are distributed independently of one another through the refuge. Of the variables considered, habitat availability and rodent abundance best predicts gross harrier foraging distribution, while perch availability and rodent abundance best predicts red-tail distribution. The introduction of artifical perches in selected areas of the refuge may enhance the area as a overwintering area for Bald Eagles (another "sit-and wait" predator) as well as Red-tailed Hawks.

Surprisingly, Northern Harriers prey significantly on birds at Holla Bend. This is contrary to reports of harrier winter food habits in northern regions of the United States, where they prey almost exclusively on voles (Microtus spp.). The apparent absence of voles from Holla Bend may force harriers to include birds as well as available rodents in their diet. Nevertheless, harriers are not important predators of waterfowl or other game birds at Holla Bend.

Manuscripts in preparation--We currently have two manuscripts acknowledging Holla Bend NWR personnel in preparation:

PRESTON, C. R. Habitat patch use by Northern Harriers and Red-tailed Hawks in winter. Intended journal: J. Wildlife Management.

PRESTON, C. R., B. EDERINGTON, AND D. GARLAND. Food habits of Northern Harriers overwintering in central Arkansas. Intended journal: J. Field Ornithology.

Copies of these completed manuscripts will be provided to interested

USFWS personnel.

LEGENDS FOR FIGURES 1-5

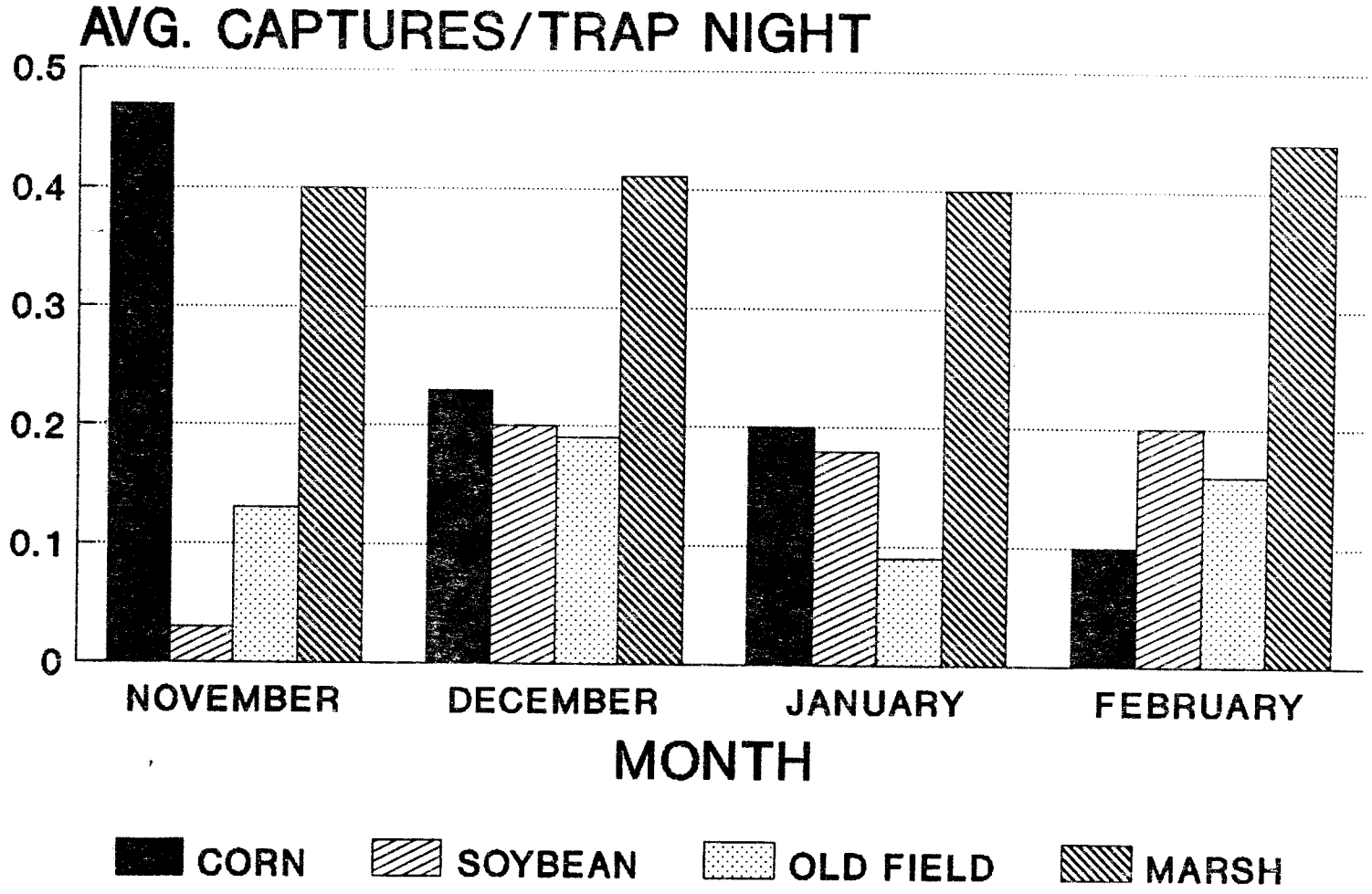
Figure 1. Average rodent captures/trap night/month for the two field seasons. All rodent species are pooled.

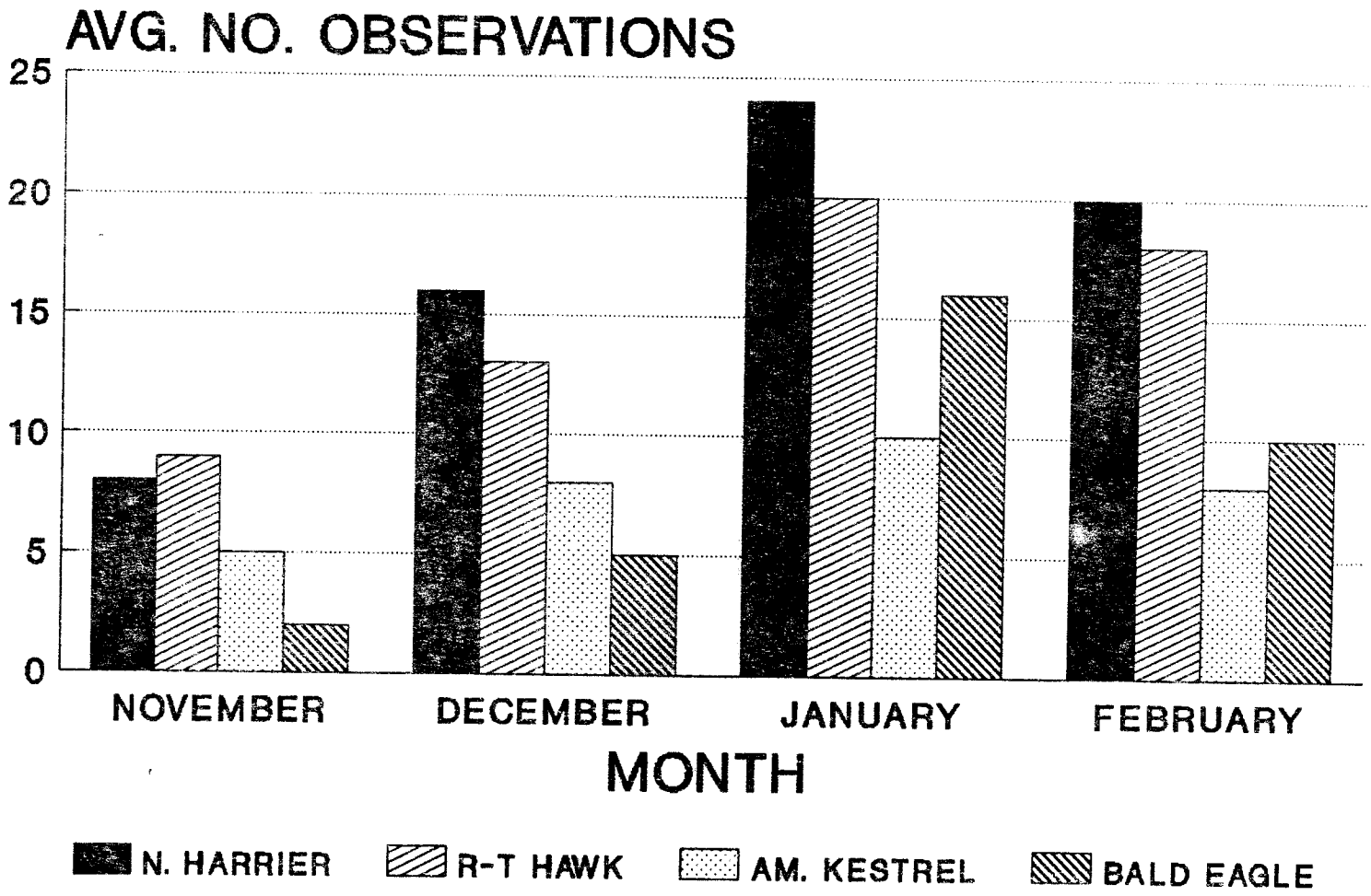
Figure 2. Average number of observations/monthly survey for the two field seasons. Roadside surveys were not intended to determine total numbers of each species, only to provide an index of monthly fluctuations of overwintering raptors.

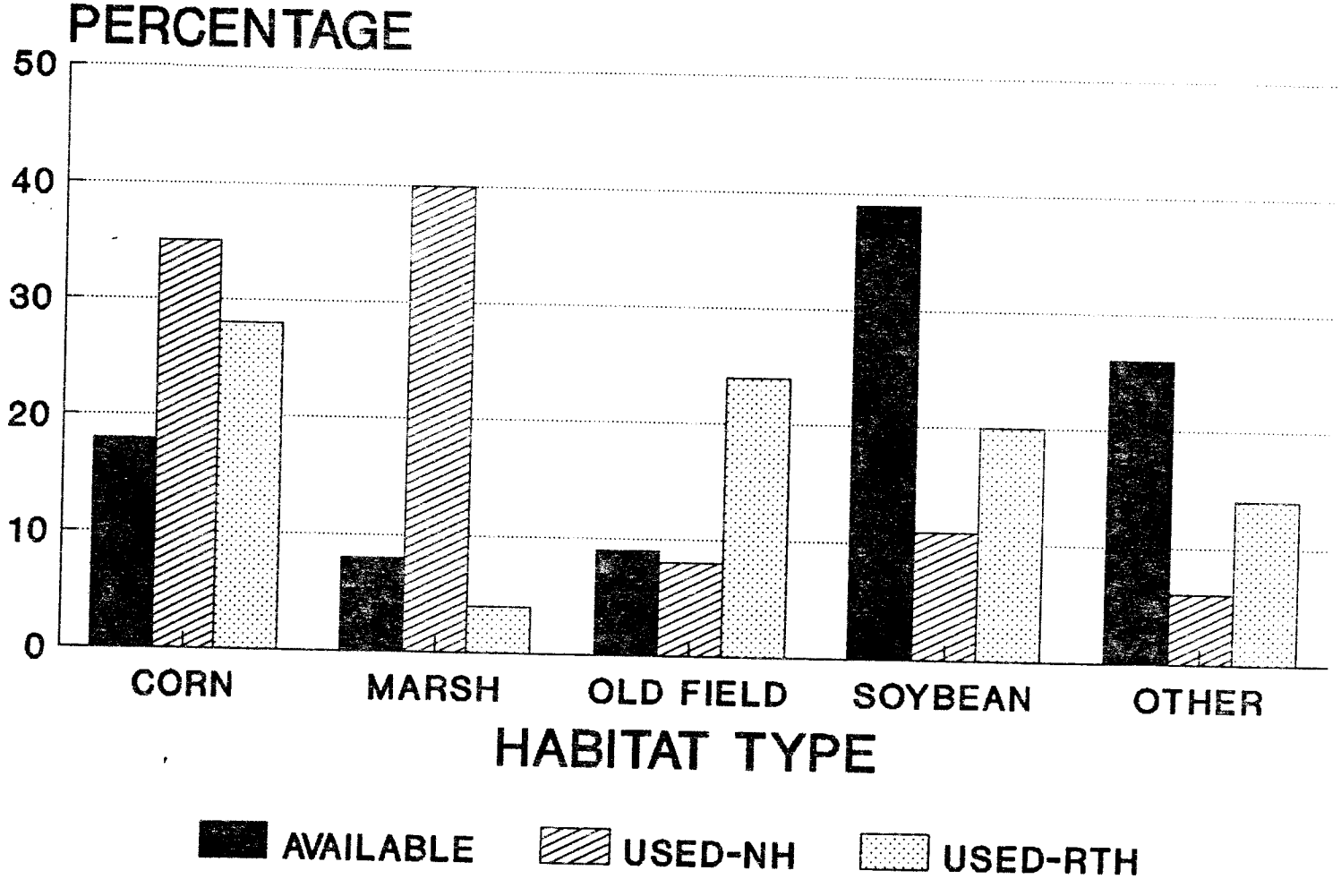
Figure 3. The relationship between habitat availability and habitat use by Northern Harriers (NH) and Red-tailed Hawks (RTH). These data were averaged for the two field seasons.

Figure 4. The distribution of Northern Harrier foraging activity in 15 sample plots. The X-axis represents the product of the area (sq. meters) and the number of rodent captures per trap night in the sample plots.

Figure 5. The distribution of Red-tailed Hawk foraging activity in 15 sample plots. The X-axis represents the product of the area within 25 meters of a perch site and the number of rodent captures per trap night in the sample plots.


AVG. CAPTURES/TRAP NIGHT
0.5
0.4
0.3
0.2
0.1
0
NOVEMBER
DECEMBER
JANUARY
FEBRUARY
MONTH
CORN
SOYBEAN
OLD FIELD
MARSH


AVG. NO. OBSERVATIONS
25
20
15
10
5
0
NOVEMBER
DECEMBER
JANUARY
FEBRUARY
MONTH
N. HARRIER
R-T HAWK
AM. KESTREL
BALD EAGLE


PERCENTAGE
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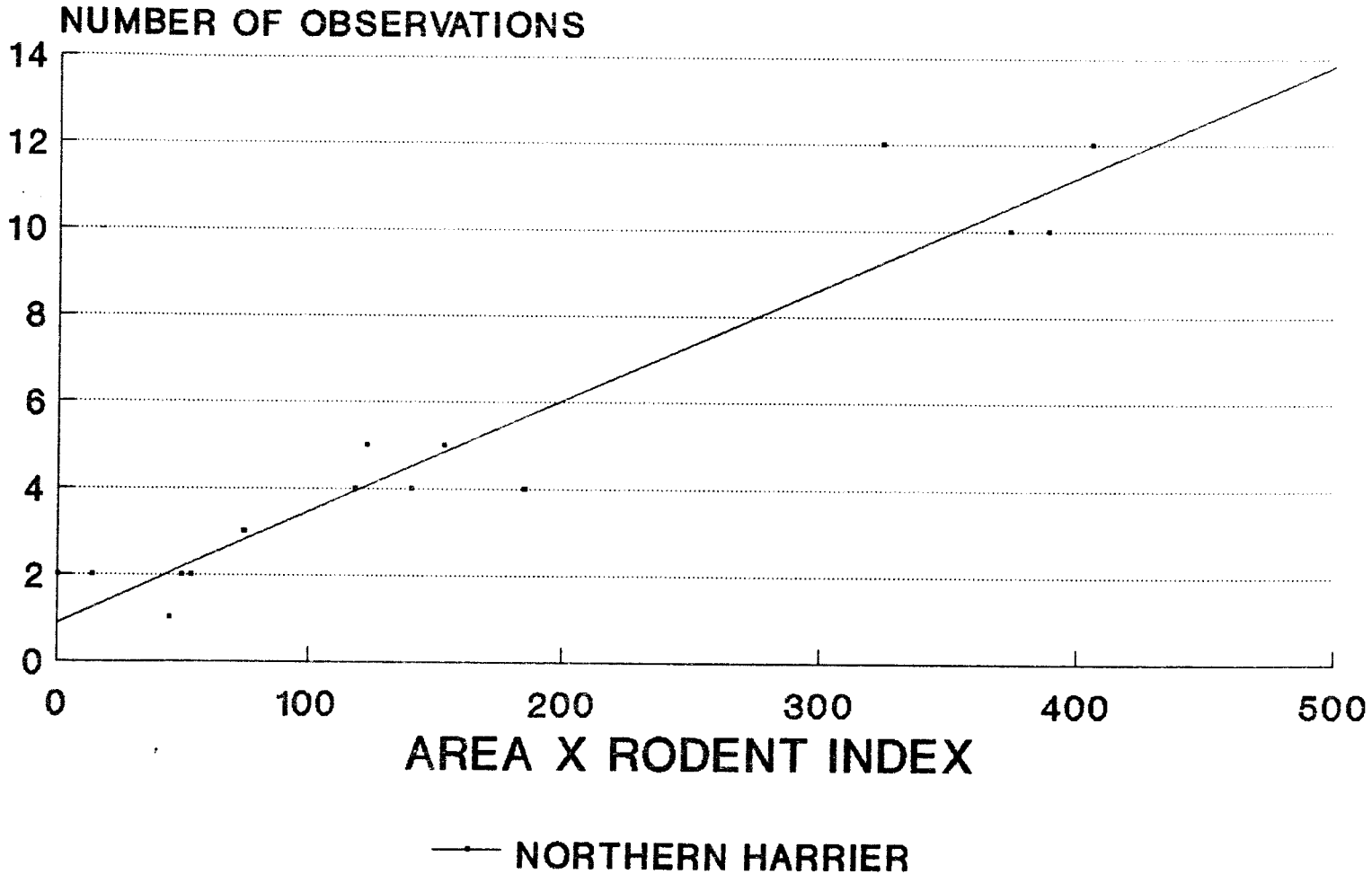
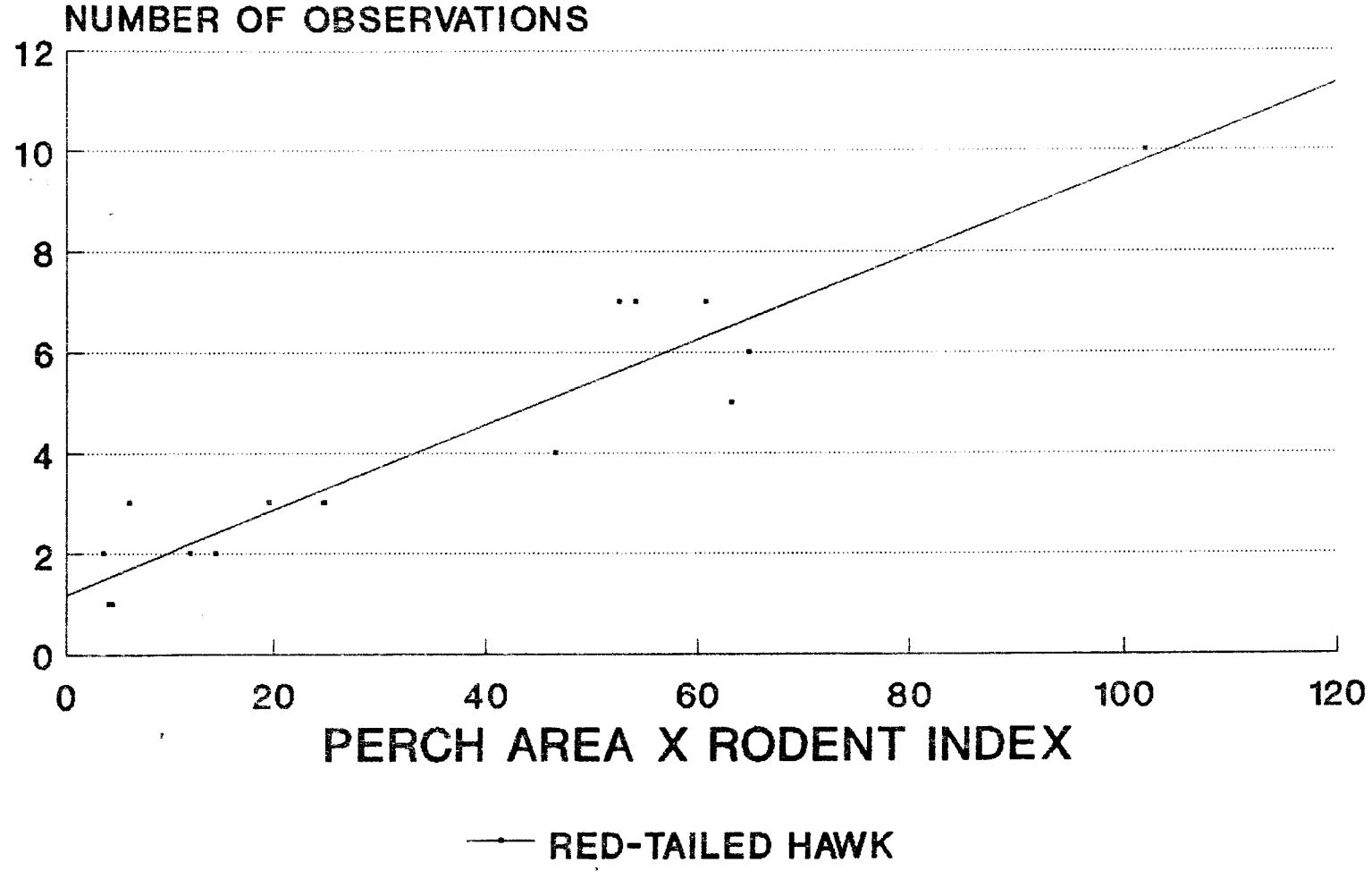
40
30
20
10
0
CORN
MARSH
OLD FIELD
SOYBEAN
OTHER
HABITAT TYPE
AVAILABLE
USED-NH
USED-RTH


NUMBER OF OBSERVATIONS
14
12
10
8
6
4
2
0
0
100
200
300
400
500
AREA X RODENT INDEX
NORTHERN HARRIER

R-SQUARE = 0.93


NUMBER OF OBSERVATIONS
12
10
8
6
4
2
0
0
20
40
60
80
100
120
PERCH AREA X RODENT INDEX
RED-TAILED HAWK

R-SQUARE = 0.90

PROPOSED FIELDWORK AT HOLLA BEND NATIONAL WILDLIFE REFUGE

1988-1990

A CONTINUATION OF PROJECT 43590-871

Dr. Charles R. Preston

University of Arkansas at Little Rock

The objectives of fieldwork to be conducted during the fall-winter period 1988-89 and 1989-90 are: a) to determine the effects of habitat island size, vegetation structure, and predation pressure on rodent community structure (UALR Scholars project conducted by Susanne Lassieur), b) to determine the effects of rodent and passerine community structure to Northern Harrier foraging distribution and capture success in selected habitat islands, and c) to determine broad geographic movement patterns of raptors overwintering at Holla Bend by banding as many individuals as possible (USFWS Master Federal Bird Marking and Salvage Permit # 21933 to Charles R. Preston).

PROCEDURES

Rodent surveys--We will use Sherman live traps to assess rodent community structure in 4-6 selected habitat islands in the refuge. Individual rodents will be toe-clipped to help determine population structure and movement patterns. Rodents will be surveyed on two successive nights once or twice each month (October, November, December, January, February, March) of the study.

Northern Harrier foraging behavior--Each habitat island selected for study will be observed for 8-10 hours each month of

the project. Observers will record minutes of foraging time spent, number of capture attempts, and number of captures by harriers in each habitat island. Regurgitated pellets will again be collected from communal roosts to provide further information regarding harrier diet.

Raptor banding--Raptors (excluding eagles) will be trapped using mist nets, bal-chatri traps, and/or 3-celled Potter traps and banded with USFWS metal leg bands. Some individuals may be color banded pending USFWS auxiliary marking authorization. All birds will be weighed, measured, and examined for disease and injury at the time of capture. After it is banded, each bird will be released at the location of capture.

SPECIAL REPORTS

Susanne Lassieur is required to complete a written Scholar's Undergraduate Thesis (see objective "a" above) by the end of April 1989. She will file a copy of her thesis and any subsequent publications originating from it with Holla Bend NWR headquarters.

Charles R. Preston is required to submit a summary report of bird banding activity to the USFWS Office of Migratory Bird Management at the end of each calendar year. He will file a copy of his reports (as they apply to Holla Bend birds) with the Holla Bend NWR headquarters.

Copies of any technical publications originating from fieldwork at Holla Bend will be filed with Holla Bend NWR headquarters. Additionally, progress and summary reports will be prepared upon request.